PHYTONEMATODES OF GRAPE AGROCENOSES IN THE SOUTH OF UZBEKISTAN

Abstract. Ecological and faunal complex of phytonematoids found in root and pre-root soils of vine agrocenoses of Surkhandarya region of the southern regions of the Republic of Uzbekistan was studied, as well as their density in individuals in the population and its impact on plants were scientifically analyzed.

Key words: phytonematoda, fauna, flora, phytoparasitism, pararizobionts, stiletto, phytohelminthiasis, mycosis.

Introduction

In Uzbekistan, in particular in Surkhandarya region, extensive research has been conducted on the fauna of plant phytohelminths, but there are very few sources of phytohelminths and their damage in vine agrocenoses, which are not enough to solve phythelminthological problems of our time and therefore require additional research. Lack of information on phytohelminths, which are the main parasites of vine plants, and the pathological conditions they cause, leads to a sharp decline in the high yield that can be obtained from the plant. Based on this, our goal is to identify the fauna of parasitic phytohelminths and develop a system to combat them.

Methods

The development of viticulture in Uzbekistan is an urgent task in solving the problems of providing the population with high-quality and various medicinal food products.

To increase the efficiency of viticulture, it is directly related to the introduction into practice of new, more suitable grape varieties for certain environmental conditions, which are resistant to unfavorable abiotic and biotic environmental factors, as well as increased productivity in combination with a good harvest quality. In addition, the productivity of grape plants and the quality of their berries and bunches from biotic factors can be limited by the wide spread of pests and diseases on them, in particular, the most dangerous of them are phytoparasitic nematodes that affect plants, caused as diseases of phytohelminthiasis. According to foreign researchers, the causative agents of phytohelminthiasis, lead to small-leaved and dwarf bushes, a sharp decrease in productivity and cause significant damage to the quality of berries and grapes [1,9]. They cause numerous and varied damage to the root system of the plant; in addition, they play an even greater role in the spread of mycotic, viral, bacterial and other diseases. Therefore, phythelminthological studies of this culture, the study of the faunistic complex of phytonematodes of grape plants and the identification of parasitic species are relevant in viticulture.

In order to determine the species composition of the faunistic complex of phytonematodes of grape agrocenoses, as well as to analyze the population density and elucidate trophic relationships with the plant in the period from 2018-2020. We collected phytonematodes from the root soil and root system of plants in 26 farms from 13 districts of the Surkhandarya region. The studies were carried out by the generally accepted route method [2,3,4].

During the phytohelminthological study, 1280 samples of soil and root system of grape plants were collected and analyzed. In the field, each soil sample, along with plant roots, was placed in a separate cellophane bag and labeled. The collected samples were analyzed in the phythelminthological laboratory. First, the roots of the plant were carefully examined for nematode infestation. Then, the root soil and root system were examined separately. To isolate nematodes from the soil and root system of plants, a modified Berman funnel method was used [1,5,6]. Exposure at room temperature + 250C was 20-28 hours, at a temperature of +300 + 350C - 10-12 hours. Soil samples for the presence of cyst nematodes were usually analyzed by the Decker method [3,7,8].

A 4-6% formalin solution was used to fix the nematodes. Enlighment of nematodes was carried out in a mixture of glycerol with alcohol (1: 3), and permanent preparations on glycerol were prepared for in-office processing of the material according to the Seinhorst method [6,9]. Preparations for determining the species of root-knot nematodes were prepared according to the well-known method of E.S. Kiryanova, E.L. Krall [2].

The species composition of nematodes were studied under an MBR-3 microscope using light filters and a phase contrast device. When determining the species belonging of plant nematodes, the works of domestic and foreign authors were used, as well as the atlas of plant nematodes compiled at the Institute of Problems of Ecology and Evolution named after A. N. Severtsov of the Russian Academy of Sciences.

To determine the species, we used morphometric parameters that are obtained according to the generally accepted de Mann formula modified according to Micoletzky [5].

Results

As a result of the carried out phytohelminthological studies in grape agrocenoses in the southern region of Uzbekistan, we found 118 species of phytonematodes belonging to 54 genera, 39 subfamilies of 33 families, 20 superfamilies, 13 suborders, 9 orders and 2 subclasses. In total, the detected nematodes by orders are distributed as...
The order Monhysterida is represented by 2 families: Plectidae, Monhysteridae; 4 genera: Anaplectus, Plectus, Proteroplectus, Monhystera; 5 species (which is 4.2% of the total number of species) and a total of 176 specimens (1.3% of the total number of detected plant nematodes).

The order Enoploida includes one family: Ochulidae; one genus: Prismatolaimus and 1 species (0.9%), a total of 28 specimens (0.2%) of phytonematodes.

The order Mononchida includes 2 families: Mononchidae, Mylonchulidae; 3 genera: Mononchus, Clarcus, Mylonchulus and 6 species (5.1%), a total of 153 specimens (1.2%) of phytonematodes.

The Dorylaimida order is represented by 8 families: Encholaimidae, Nygolaimidae, Dorylaimidae, Qudsianematidae, Aporcelaimidae, Discolaimidae, Nordiidae, Xiphinema; 11 genera: Enchodelus, Nygolaimus, Pararycholaimus, Mesodorylaimus, Dorylaimellus, Eudorylaimus, Aporcelaimus, Aporcelaimellus, Discolaimium, Longidorella, Xiphinema; 23 species (19.5%); a total of 844 individuals (6.3%) of phytonematodes.

The order Alaimida includes 2 families: Alaimidae, Diphtherophoridae; 2 genera: Alaimus, Diphtherophora and 5 species (4.2%), a total of 110 specimens (0.8%) of phytonematodes.

The order Rhabditida includes 2 families: Rhabditidae, Diplogastriidae; 4 genera: Messorhabditis, Peloderha, Rhabditis, Mesodiplogaster; 7 species (5.9%), a total of 697 individuals (5.3%) of phytonematodes.

The order Teratocephalida is represented by 3 families: Panagrolaiminae, Cephalobinae, Acrobelinae; 8 genera: Panagrolaimus, Heterocephalobus, Cephalobus, Eucephalobus, Acrobeloides, Chiloplacus, Acrobeles, Cervidelus; 25 species (21.2%), a total of 3747 individuals (28.9%) of phytonematodes.

The order Tylenchida includes 8 families: Tylenchidae, Dolichodoridae, Psilenchidae, Hoplolaimidae, Rotylenchulidae, Pratylenchidae, Meloidogynidae, Paratylenchidae; 13 genera: Tylenchus, Filenchus, Aplechnus, Lelenchus, Tylenchorhynchus, Bitylenchus, Psilenchus, Helicotylenchus, Rotylenchus, Pratylenchus, Pratylenchoideae, Meloidogyne, Paratylenchus; 27 species (22.9%), a total of 5261 specimens (40.2%) of phytonematodes.

The above analysis shows that among the orders in terms of species composition, the order Tylenchida occupies the first place, which is 22.9% of all detected species of nematodes of grape plants. Then the order Teratocephalida (21.2%), the order Dorylaimida (19.5%) and the order Alaimida (16.1%).

In terms of the number of individuals among the orders, the first place is occupied by the order Tylenchida, which is 40.2% of the total number of detected phytonematodes. Then the order Teratocephalida (28.9%), the order Aphelechida (15.8%) and the order Dorylaimida (6.3%).

Phytonematodes identified from the roots and rhizosphere of grape plants, according to the ecological classification of A.A. Paramonov [3], belong to 5 ecological groups: para-risobionts - 29 species (24.6% of the total number of species), 970 individuals (7.4% of the total number of detected phytonematodes); deisaprobionts - 11 species (9.3%), 779 individuals (6.1% of phytonematodes); eusaprobionts - 29 species (24.6%), 3871 individuals (29.6%) of phytonematodes; phytohelnminths of nonspecific pathogenic effect - 30 species (25.4%), 3661 individuals (28.0%) of phytonematodes; phytohelnminths of specific pathogenic effect - 19 species (16.1%), 3787 individuals (28.9%) of phytonematodes (Table 2).
Species *Monhystera filiformis*, *Prismatoaimus intermedius*, *Clarcus papillatus*, *Mesodorylaimus bastiani*, *M. parasubulatus*, *Eudorylaimus centrocercus*, *E. kirjanovae*, *E. paraohtusicaudatus*, *E. parvus*, *E. pratensis*, *Aporcelaimus superbus*, *Aporcelaimellus abituscaudatus*, *A. obscurus* and *Discolaimium cylindricum* root soil in large numbers.

The species *Anaplectus granulosus*, *Proteorhops ravnensis*, *Myelonchulus parabrahryurus*, *Nygoaimus brachyurus*, *Paradorylaimus filiformis*, *Dorylaimellus mirus*, and *Alaimus striatus* are the smallest in number of individuals.

The group of eusaprobionts in the material studied by us turned out to be the group with the smallest number of species (11 species), only 9.3% of the total number of species. Representatives of this group include the family Rhabditidae (6 species). From eusaprobionts *Rh. brevispinus* was found in large numbers in the root system of plants and root soil. The species *Myelonchulus parabrahryurus*, *M. solus* were found only in the rhizosphere, and in the smallest number of individuals.

The group of devisaprobionts includes 29 species (only 24.6% of the total number of species), which belong to the orders Plestida and Teraocephalida; family Plestidae, Cephalobidae and Paragrolaimidae. They were found in the root system and rhizosphere of plants.

The species *Panagrolaimus rubricaudus*, *P. multidentatus*, *P. subelongatus*, *Heterocephalobus elongatus*, *Cephalobus persegnis*, *Acrabeloides buetschlii*, *A. Nanus*, *Chiloplacus propinquus* found in the rhizosphere and root system of grape plants were the most numerous in terms of the number of individuals.

The species *Panagrolaimus armatus*, *P. spondyli*, *Chiloplacus lentus*, *Cervidelus insubricus* were found in insignificant numbers in terms of the number of individuals.

The species *Chiloplacus summetricus* and *Acroboles ciliatus* are found only in the rhizosphere of plants.

**Conclusion**

The most numerous in terms of the number of species was the group of phytohelmints of nonspecific pathogenic effect, including 30 species belonging to the orders *Aphelenchida* and *Tylenchida*; families *Aphelenchidae*, *Paraphelenchidae*, *Aphelenchoiidae*, *Tylenchidae*, *Pslenchidae*. Among species in terms of the number of individuals and species composition, *Aphelenchoides helophilus* occupies the first place, which is 63.3% of the total number of species and 8.3% of the total number of individuals of the detected phytonematodes.

Species *Aphelenchus avenae*, *A. cylindrica*, *Paraphelenchus pseudoparietinus*, *Aphelenchoides claronieata*, *A. dactylocercus*, *A. limberi*, *A. parietinus*, *A. parasubtena*, *A. trivialis*, *Tylenchus davainei*, *Filenchus filiformis*, *Aglenchus thornei*, *Neotylenchus abulbosus*, *Ditylenchus intermedius*, *D. mycieliphaga*, *D. talaganoi*, *Nolothylenchus alli* were found in the rhizosphere and root system of grapes, and were the most numerous in terms of the number of individuals.

**Phytonematode** *Paraphelenchus tritici*, *Aphelenchoides helophilus*, *A. parabiocaudatus*, *A. passillus*, *A. sacchari*, *A. teres*, *Bursaphelenchus talonius* were insignificant in the number of individuals.

Phytohelmints with a specific pathogenic effect, including 19 species belonging to the orders *Dorylaimida* and *Tylenchida*; families *Xiphinematidae*, *Dolicodorididae*, *Hoplolaimidae*, *Rotylenchulidae*, *Pratylenchidae*, *Meloidogyniidae*, *Paratylenchidae*, *Anguiniidae* were found in a large number of phytonematodes.

Among the true parasites, the dominant species were *Tylenchorynychus capitatus*, *T. brassicae*, *Bitylenchus dubius*, *Helicotylenchus dihystera*, *H. erythrinae*, *H. multicinctus*, *Pratylenchus pratensis*, *P. neglectus*, *Ditylenchus dipsaci*. They were found in the rhizosphere and the root system of plants, and were the most numerous in terms of the number of individuals.

The species *Psilenchus clavicaudatus*, *Meloidogyne arenaria*, *Pratylenchoides crenicauda*, *Paratylenchus amlycephalus*, *P. macrophallus*, *Neoditylenchus pinophilus* were found in a small number of phytonematodes.

The analysis of the research shows that the fauna of phytonematodes of grape plants in the south of the Republic has not been studied. Therefore, carrying out large-scale phytoelmintological studies to study the faunistic complex of phytonematodes of grape agroecoses in this territory, as well as the identification and degree of harmfulness of parasitic species, is of great scientific and practical importance in the development of viticulture in the republic.
References


